

Rhode Island Department of Health
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Vol. 3, No. 1

January 2001

Edited by Jay S. Buechner, PhD

Invasive Disease Attributed to *Streptococcus pneumoniae*, 1998-1999

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Each year, *Streptococcus pneumoniae* infections cause an estimated 3,000 cases of meningitis, 50,000 cases of bacteremia, 500,000 cases of pneumonia, and 7 million cases of otitis media in the United States.¹ Pneumococcal infection causes an estimated 40,000 deaths annually.¹ Pneumococcal disease poses an even greater public health threat due to the proliferation of penicillin resistant strains. Many penicillin resistant strains of *S. pneumoniae* are also resistant to other antimicrobials.

The increasing prevalence of resistant organisms underscores the importance of primary prevention. The newly licensed pneumococcal conjugate vaccine for infants and toddlers has just been added to the state's universal vaccine distribution program. For adult Rhode Islanders, the pneumococcal polysaccharide vaccine can prevent a substantial number of pneumococcal infections; however only 55% of Rhode Islanders ages 65 years and older report that they have received pneumococcal vaccine.² (Table 1)

Methods. In 1996, information on antibiotic susceptibility for invasive *Streptococcus pneumoniae* became reportable in Rhode Island. In 1998, the Rhode Island Department of Health (HEALTH) embarked on a surveillance project to monitor the incidence of invasive disease attributed to *Streptococcus pneumoniae*. For surveillance purposes, a case of invasive disease includes a person from whom *S. pneumoniae* was isolated from a normally sterile site (e.g., blood, pleural fluid, cerebrospinal fluid, peritoneal fluid, pericardial fluid, or synovial fluid and specimens collected during sterile procedures) in 1998 and 1999.

Cases were characterized according to their sensitivity to penicillin based on laboratory results. Intermediate susceptibility to penicillin was defined as a minimum inhibitory concentration (MIC) of 0.12-1.0 micrograms/mL; resistance to penicillin was defined as an MIC equal to or greater than 2.0 micrograms/mL.³ The term "nonsusceptible" refers to both intermediate and resistant organisms. Patient medical records were reviewed for demographic and clinical information, including information on antibiotic susceptibility.

Results. In 1998, 210 reports were received and in 1999, 203 reports were received by HEALTH. Pneumococcal disease is primarily

a disease of the very young and the elderly. Case rates are high for children under five years of age, are low (less than 10.0/100,000) for ages 5-39, and then gradually increase to 70/100,000 for those ages 70 and older. (Figure 1)

Slightly more cases during the two years were in males (50.8%). The rate of invasive disease was substantially higher among blacks compared to whites and Hispanics. (Table 2) The most common types of infection caused by *Streptococcus pneumoniae* included pneumonia (with bacteremia) in 67% of cases and primary bacteremia (21% of cases). Twelve percent of cases had other types of infection.

Forty-three cases died, for a mortality rate of 2.2/100,000. The age of fatal cases ranged from 30 to 95 years with a mean of 73.6 years and a median of 78.0 years. Higher rates have been reported in other studies; however, no long-term follow-up of cases

Table 1. Vaccination Rates for People Ages 65 and Older,
Rhode Island, 1995-1999

Type of Vaccine	1995	1997	1999
Influenza	65.6%	67.7%	73.7%
Pneumococcal	29.2%	43.0%	54.7%

Source: See Reference 2

Table 2. Incidence of Invasive Disease Attributed to
Streptococcus pneumoniae, by Gender, Race and Ethnicity,
Rhode Island, 1998-1999.

Gender	Number of Cases	Percent of Cases
Male	210	50.8
Female	203	49.2
Total	413	100.0
Race/Ethnicity	Number of Cases	Rate ¹
White	330	19.2
Black	35	35.4
Hispanic	21	16.1
American Indian/Alaskan Native	0	-----
Asian/Pacific Islander	1	-----
Unknown	26	-----
Total	413	20.9

¹Rates are cases/100,000 population. Rates are based on 1998 Rhode Island population estimates from the U.S. Bureau of the Census.

Table 3. Antibiotic Susceptibility for Pneumococcal Isolates, Rhode Island, 1998-1999.

LEVEL OF RESISTANCE	1998 Number of Isolates	1998 Percent of Isolates	1999 Number of Isolates	1999 Percent of Isolates
MIC Penicillin Resistant	12	5.7	15	7.4
MIC Penicillin Intermediate	24	11.4	29	14.3
Susceptible	173	82.3	149	73.4
Unknown	1	0.6	10	4.9
Total	210	100.0	203	100.0

was conducted in this study as has been done in other studies.

Penicillin sensitivity information was received on 99.4% of cases in 1998 and 95.1% of cases in 1999. Of those cases with sensitivity data available, 17.1% of cases in 1998 were nonsusceptible and in 1999, 21.7% of cases were reported nonsusceptible. (Table 3) Susceptibility information on other commonly used antimicrobials was not as widely available.

Discussion. Two years of surveillance data for inva-

sive disease attributed to *Streptococcus pneumoniae* suggest that this often preventable illness strikes the very young and the elderly. Blacks had higher incident rates of infection than whites or Hispanic persons. Clinically, the majority of cases presented with bacteremia and pneumonia. At the time of chart abstraction, 10.4% of cases had died.

The overall goal of this surveillance system is to determine statewide specific levels of resistance and make data available to assist clinicians in prescribing antimicrobials.

Preliminary surveillance data have provided baseline information on resistance rates in Rhode Island; a future challenge for HEALTH is to encourage complete antibiotic susceptibility testing including MICs for other broad-spectrum antibiotics. In addition, ongoing surveillance of age-specific morbidity will be useful to evaluate the effectiveness of the adult and childhood vaccination programs.

In addition, HEALTH will continue to develop and integrate prevention and control strategies which include the development and marketing of educational materials for health care providers and the public about judicious use of antibiotics; the on-going promotion of pneumococcal polysaccharide vaccine; and promoting the integration of the newly licensed pneumococcal conjugate vaccine⁴ into the childhood vaccination schedule.

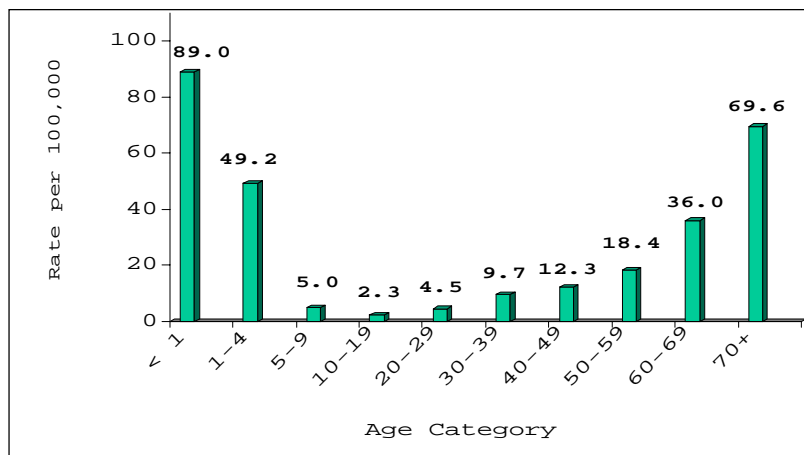


Figure 1. Incidence of Invasive Disease Attributed to *Streptococcus pneumoniae*, by Age Group, Rhode Island, 1998-1999.

Originally published in the January 2001 issue of *Medicine & Health / Rhode Island*

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³National Committee for Clinical Laboratory Standards. Performance standards for antimicrobial susceptibility test (M 100-S8). Vol. 18. Villanova, Pennsylvania: National Committee for Clinical Laboratory Standards, 1998.

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